

We Claim:

1. A method of detection of a run-flat condition of a vehicle tire, said tire being mounted on a wheel, wherein:

- a quantity  $f(\alpha, t)$  is sensed, which varies with the angular displacement of the wheel in time;
- measuring signals are developed from that quantity, which vary with the angular speed of the wheel  $d\alpha(t)/dt$ ;
- a quantity characteristic of the dispersion of measuring signals is calculated;
- an alarm is set off when the characteristic quantity satisfies a given ratio.

2. A method of detection according to Claim 1, in which said characteristic quantity is the value of the standard deviation of said measuring signals.

3. A method of detection according to Claim 1, in which, in order to calculate the characteristic quantity of dispersion of the measuring signals:

- the rotation frequency of the wheel is determined;
- the energy of the measuring signals is calculated in at least one narrow frequency band centered on one of the first harmonics of said rotation frequency; and
- an alarm is set off when said energy satisfies a given ratio.

4. A method of detection according to Claim 3, in which the rotation frequency of the

1 wheel is determined from said measuring signals.

2 5. A method of detection according to Claim 3, in which the energy of said measuring  
3 signals is calculated in at least two narrow frequency bands, each centered on one of the first  
4 harmonics of the rotation frequency of said wheel, with the exception of the first harmonic.

1 6. A method of detection according to Claim 3, in which, after having detected that the  
2 sum of the energies of the measuring signals in at least two narrow frequency bands centered on one  
3 of the first harmonics satisfies a given ratio, the energy of the measuring signals is compared in each  
4 of said frequency bands to a given corresponding threshold and an alarm is set off when, for at least  
5 two of said frequency bands, the energy of the signals is higher than said corresponding threshold.

1 7. A method according to Claim 3, including comparing the energy or energies of the  
2 measuring signals of the wheel of said tire with the energy or energies of the measuring signals of at  
3 least one of the other tires of the vehicle and an alarm is set off when the result of the comparison  
4 satisfies a given ratio.

1 8. A method of detection according to Claim 3, in which measuring signals are  
2 developed which vary with the angular acceleration of the wheel  $d^2\alpha(t)/dt^2$ .

1 9. A method of detection according to Claim 3, in which said narrow frequency band or  
2 bands has a width less than or equal to 10 hertz.

1 10. A method of detection according to Claim 3, in which the energy of said measuring  
2 signals is further calculated in at least a second frequency band, where the measuring signals are  
3 substantially independent of the run-flat condition of said tire and no alarm is set off when the  
4 measuring energy in said second frequency bands exceeds a given threshold.

1 11. A method of detection according to Claim 10, in which said second frequency bands  
2 are situated outside the multiple frequencies of the rotation frequency of said wheel.

1 12. A method of detection according to Claim 1, in which no alarm is set off when the  
2 speed of said vehicle is below a given threshold.

1 13. A method of detection according to Claim 1, in which the location of the tire in run-  
2 flat condition is identified and transmitted to the driver of the vehicle.

1 14. A method of detection according to Claim 1, in which, a vehicle containing a wheel  
2 antilock device, the measuring signals are developed from sensors of said wheel antilock device.

1           15.    A system of detection of a run-flat condition of a vehicle tire, said tire being mounted  
2 on a wheel, comprising:

- 3    - first means for sensing a quantity  $f(\alpha, t)$  which varies with the angular displacement of the wheel  
4      in time,
- 5    - second means for elaborating measuring signals from that quantity, which vary with the angular  
6      speed of the wheel  $d\alpha(t)/dt$ , calculating a characteristic quantity of dispersion of the measuring  
7      signals and setting off an alarm when said characteristic quantity satisfies a given ratio;
- 8    - third means for transmitting said alarm to the driver of the vehicle; and
- 9    - fourth means arranged in the mounted tire/wheel assembly to generate vibrating warning signals  
10     on a run-flat condition of the tire.

1           16.    A system according to Claim 15, in which said means for generating vibrating  
2 warning signals generate at least one sinusoidal function, the period of which is a submultiple of a  
3 turn of the wheel.

1           17.    A system according to Claim 16, in which said means for generating vibrating  
2 warning signals appreciably generate only one sinusoidal function, the period of which is a  
3 submultiple of a turn of the wheel.

1           18.    A system according to Claim 15, in which, a vehicle being equipped with a wheel

2 antilock device, the first and second means consist of the sensors and computer of said wheel  
3 antilock device.

1 19. A safety insert intended to be radially mounted outside the rim of a wheel, said safety  
2 insert containing on its radially outer surface axially oriented bars, characterized in that said bars  
3 have sides whose inclination from normal to the tread in the longitudinal direction varies as a  
4 function of azimuth.

1 20. A safety insert according to Claim 19, in which the longitudinal inclination of the bars  
2 as a function of azimuth is at least a sinusoidal function whose period is a submultiple of the turn  
3 of the insert.

1 21. A tire intended to equip a wheel, said tire containing a tread, two sidewalls and two  
2 beads as well as support elements intended to support the tread in case of run-flat condition,  
3 characterized in that said support elements contain means for generating rotation speed variations  
4 on a run-flat condition of said tire.

1 22. A tire according to Claim 21, in which said means for generating rotation speed  
2 variations of said wheel entail a variation as a function of azimuth of the radius under load of said  
3 tire on running with a tire deflection above a given threshold.

4           23.     A tire according to Claim 22, in which the variation as a function of azimuth of the  
5     radius under load of said tire is at least a sinusoidal function, the period of which is a submultiple  
6     of a turn of the insert.

1           24.     A wheel intended to receive a tire, characterized in that it contains means for  
2     generating rotation speed variations of said wheel on a run-flat condition of said tire.

1           25.     A wheel according to Claim 24, in which said wheel presents a variation as a  
2     function of azimuth of the radial height of at least one of its flanges.

1           26.     A wheel according to Claim 25, in which said variation of radial height of at least  
2     one of the flanges as a function of azimuth is obtained by the addition of an extra part at least  
3     partially covering the radial end of said flange.

1           27.     A wheel according to Claim 25, in which said variation of radial height of at least  
2     one of the flanges as a function of azimuth is at least a sinusoidal function, the period of which is  
3     a submultiple of a turn of the insert.